Math 104 Practice Test #1 Fall 2007

1. Find all six trigonometric functions of θ if $(-3, \sqrt{7})$ is on the terminal side of θ.
SOLN: see Quiz#1

2. Find $\cos\theta$ and $\sin\theta$ if the terminal side of θ lies along the line $y = -2x$ in quadrant IV. Find θ.
$\sin\theta = \frac{-2}{\sqrt{5}}$
$\cos\theta = \frac{1}{\sqrt{5}}$
$\hat{\theta} = \arccos\frac{1}{\sqrt{5}} = 63.4°$, note that arccos is the same as *inverse* cosine.
Since θ is in QIV, then $\theta = 360° - 63.4° = 296.6°$.

3. Find the remaining trigonometric functions of θ if $\csc\theta = 3$ and θ terminates in quadrant II.
SOLN: see Quiz#1

4. Show that $\cos\theta(\sec\theta + \tan\theta) = 1 + \sin\theta$ by transforming the left side into the right side.

5. Use identity substitutions to simplify as much as possible:
a. $\csc\theta - \cot\theta\cos\theta$
SOLN (a): $\sin\theta$
b. $(\cos\theta + \sin\theta)^2$
SOLN (b): $1 + 2\sin\theta\cos\theta$
c. $\sqrt{\frac{-\sin\theta}{\csc\theta} + \cos\theta\sec\theta}$
SOLN (c): $|\cos\theta|$

6. Simplify the expression $\sqrt{x^2 - 64}$ as much as possible after substituting $8\csc\theta$ for x.
SOLN: $8|\cot\theta|$

7. If $\cos\theta = \frac{1}{a}$ with θ in quadrant II, find $\sin\theta$, $\csc\theta$, and $\cot\theta$.
SOLNs: $\sin\theta = \frac{\sqrt{a^2-1}}{|a|}$

$\csc\theta = \frac{|a|}{\sqrt{a^2-1}}$
$\cot\theta = \frac{-1}{\sqrt{a^2-1}}$

8. In which quadrant will θ lie if $\sec\theta > 0$ and $\sin\theta < 0$?
SOLN: QIV

9. In $\triangle ABC$, $C = 90°$, $A = 60°$, and $a = 12$cm. Find EXACT answers for each of the following:
a. Side c $8\sqrt{3}$cm
b. Side b $4\sqrt{3}$cm

10. In $\triangle ABC$, $C = 90°$, $c = 4.79$cm, and $b = 3.68$cm. Draw the triangle and then find each of the following:
a. Side a 3.1cm
b. Angle A 39.8°
c. Angle B 50.2°

11. Find
a. $\tan 15°45\prime = 0.282029$
b. θ if θ is acute and $\sec\theta = 1.923$.

12. Practice on some word problems.

13. A pilot, flying at an alititude of 5000ft, wishes to approach a landing point on a runway at an angle of 10° (angle of depression). Approximate, to the nearest 100ft, the distance from the airplane to the landing point at the beginning of the descent.
SOLN: 28,800 ft

14. Give EXACT values of:
a. $\sin\frac{2\pi}{3}$
b. $4\cos\frac{-3\pi}{4}$
c. $\csc\frac{5\pi}{6}$

15. Find the EXACT values of:
a. $\sec 45^\circ$
b. $\csc 60^\circ$
c. $\sin^2 60^\circ + \cos^2 45^\circ$ (simplify as much as possible)

16. Draw the following angles in standar position and find the reference angle:
a. $280^\circ 20\prime$
b. -225°
c. $\frac{13\pi}{12}$

17. Convert to radians:
a. $-120^\circ = \frac{-2\pi}{3}$
b. $250^\circ = \frac{25\pi}{18}$

18. Convert to degrees:
a. $\frac{4\pi}{3} = 240^\circ$
b. $\frac{7\pi}{12} = 105^\circ$

19. Show that cotangent is an odd function.

20. Use a calculator to find θ if θ is between 0° and 360°, and
a. $\cos\theta = -0.4772$ with θ in quadrant III.
$\theta = 241.5^\circ$
b. $\sec\theta = 1.545$ with θ in quadrant IV.
$\theta = 310.3^\circ$

21. If θ is a central angle that subtends an arc length of $s = \frac{\pi}{4}$, find the radius of the circle.
$r = 1$

22. Find the area and arc length of the sector formed by central angle $\theta = 2.4$ radians in a circle of radius $r = 3$cm.
$A = 10.8$ cm squared
$s = 7.2$ cm